Project 11-016: Marine Explosive Mishap Rate Analysis

Data

Data Range: FY05 to FY10
Data Source: WESS from February 16, 2011.

Bottom line Up Front

- There is a statistical significant increase in the FY10 Marine Class C on duty explosive mishap rate.
- There are statistically significant increases in the FY10 Marine Class D on duty explosive mishap rate and count.

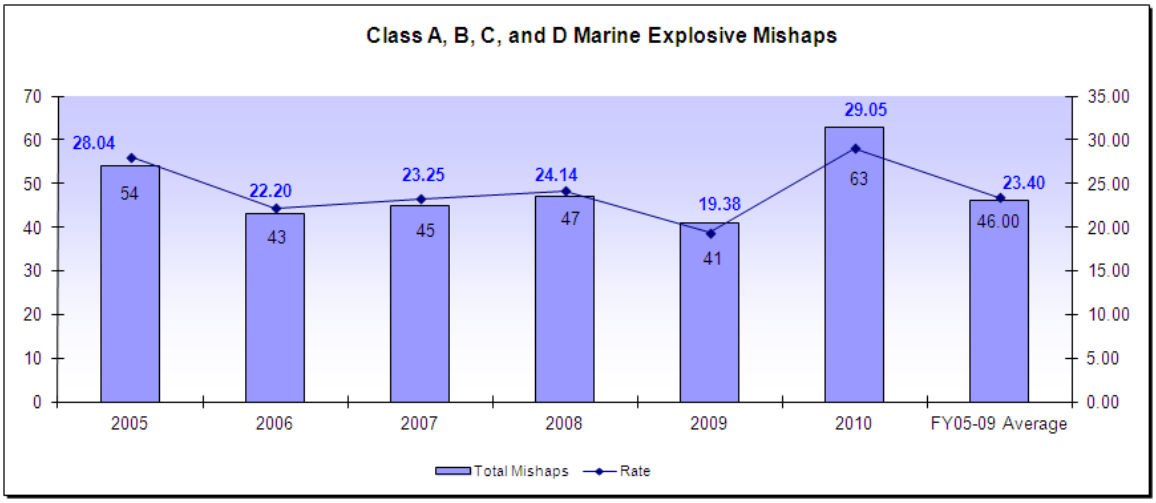

Figure 1: Marine On Duty Explosive Count and Rates

The graph in Figure 1 graphs the total number of Marine on duty explosive mishaps, Marine rate per 100,000 persons per fiscal year and the FY05-09 average count and rate. Starting in FY07, the Marine on duty explosive mishap rates and numbers tend to be on a upward trend with the largest spike occurring in FY10.

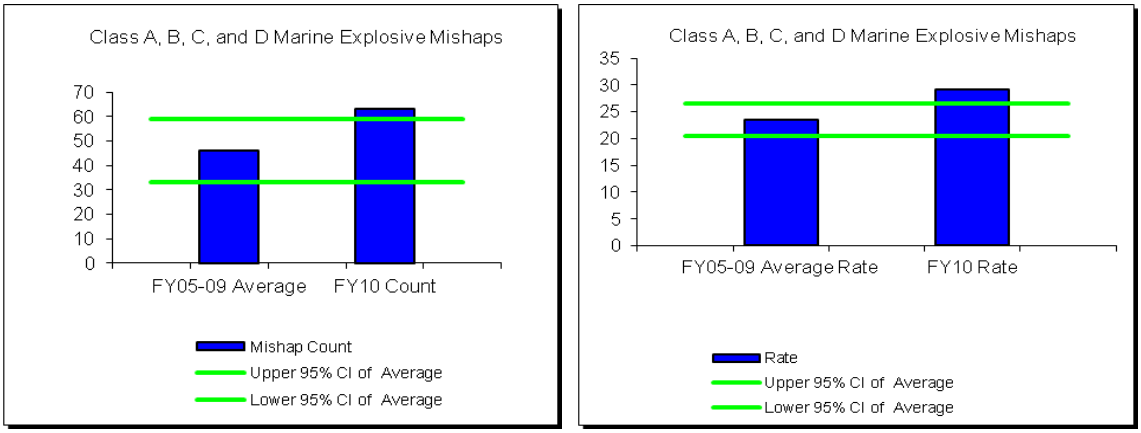

Figure 2: Marine On Duty Explosive Mishaps

The first graph in Figure 2 graphs the 5-year average for the Marine on duty explosive mishaps and the number of on duty explosive mishaps for FY10 along with the 95% confidence region denoted by the green lines. Using the Poisson distribution, the confidence interval range is calculated to be between 33 and 59 mishaps. Since the FY10 number of on duty explosive mishaps reported is above this range, it can be concluded there is statistical significant increase in the number of Marine explosive mishaps occurring in FY10. The second graph in Figure 2 graphs the 5-year average Marine on duty explosive mishap rates, the FY10 Marine on duty explosive mishap rate and the 95% confidence interval depicted by the green lines. The FY10 rate again is above the upper confidence boundary indicating there is a statistically significant increase in the FY10 Marine on duty explosive mishap rate.

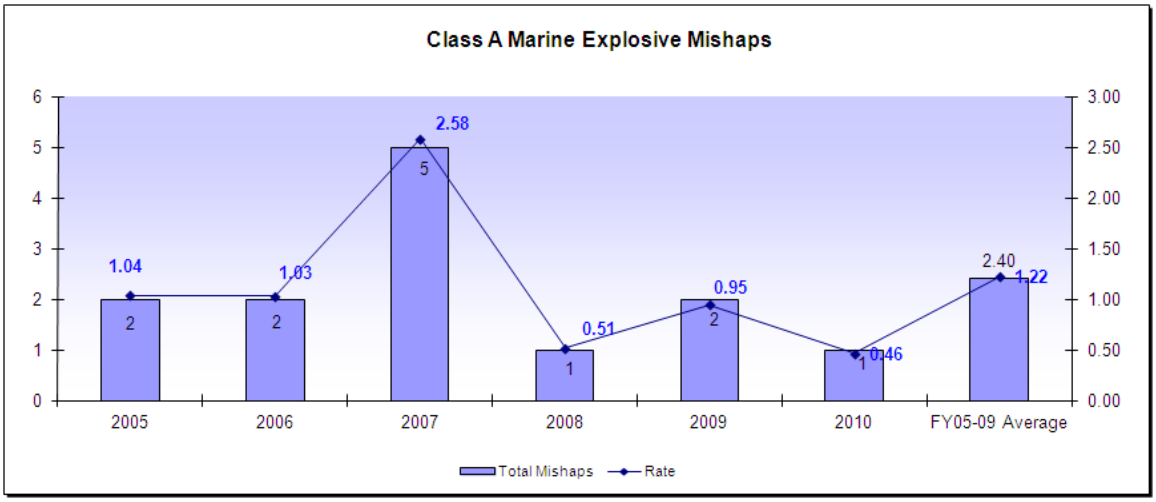

Figure 3: Marine Class A On Duty Explosive Mishaps

Figure 3 is similar to Figure 1 graphing the number of Marine Class A on duty explosive mishaps, the Marine rate per 100,000 persons per fiscal year, and the FY05-09 average count and rates. Class A mishaps tend to be relatively consistent of the 6 year period except for a spike in FY07.

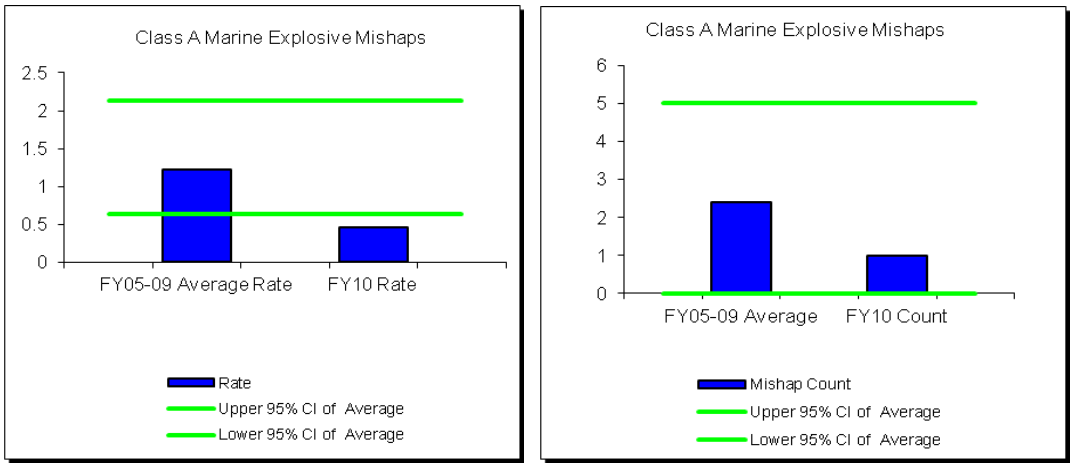

Figure 4: Marine Class A On Duty Explosive Mishaps

The two graphs in Figure 4 are similar to the graph in Figure 2. The first graph charts the 5 year average of Marine on duty explosive rates and the FY10 Marine on duty explosive mishap rate along with the 95% Poisson distribution confidence interval represented by the green lines. The next graph charts the 5-year count average of Marine on duty explosive mishaps and the number of Marine on duty explosive mishaps that have occurred in FY10 along with 95% confidence interval. The FY10 rate falls below the confidence interval indicating the FY10 is statistically significantly lower than the 5 year average rates. On the other hand, the FY10 number of Marine on duty explosive mishaps falls within the confidence indicating no statistically significant difference.

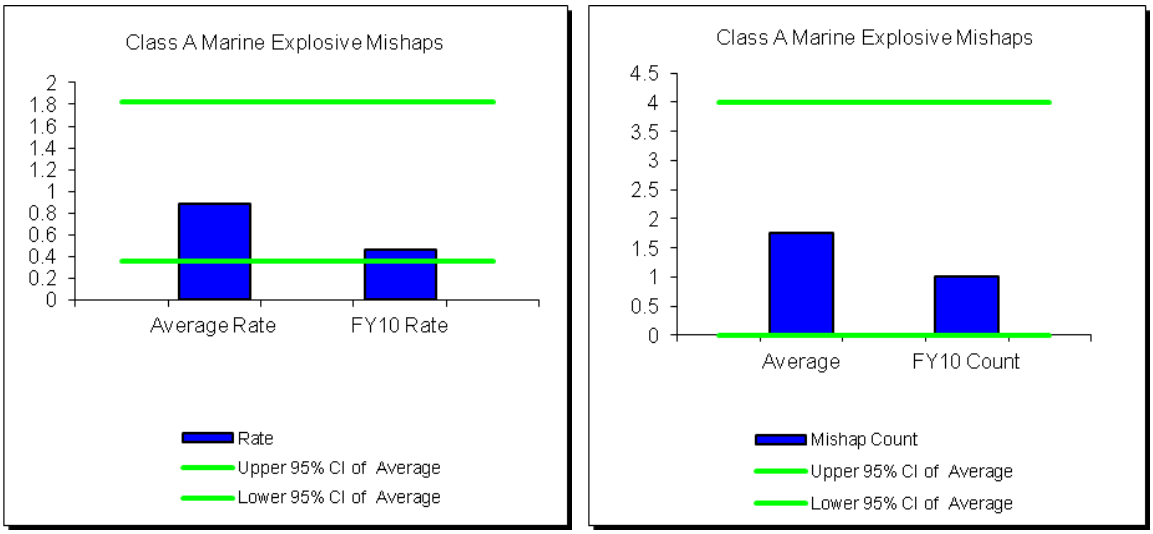

Figure 5: Marine Class A On Duty Explosive Mishap excluding FY07

Since the spike in the number of mishaps in FY07 seems to be an anomaly, the graphs in Figure 5 exclude the FY07 data. When the FY07 mishaps are not included, the FY10 rate falls within the confidence interval indicating there is no statistically significant decrease. The FY10 count remains within the confidence interval.

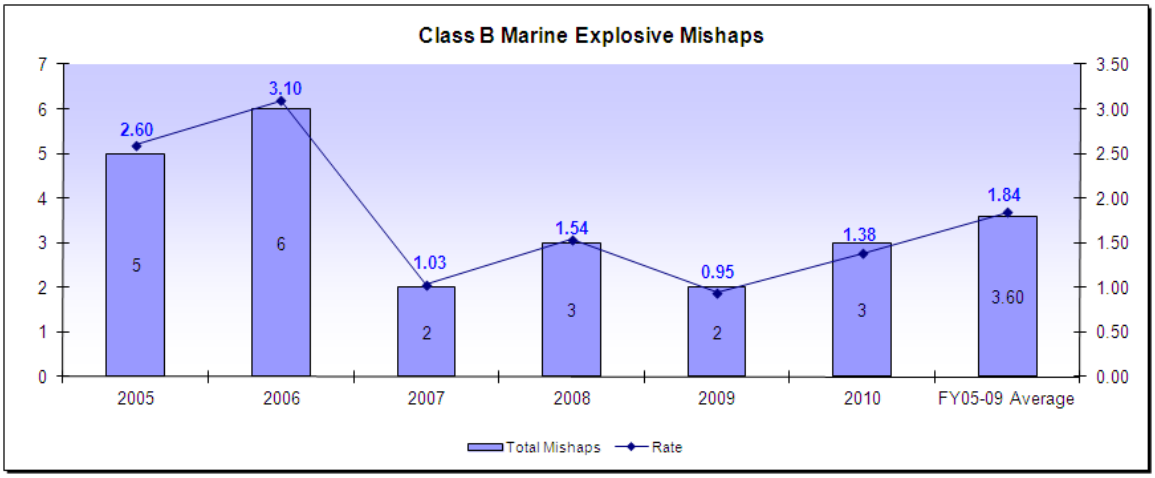

Figure 6: Marine Class B On Duty Explosive Mishaps

Figure 5 graphs the number and rate per 100,000 persons of Marine on duty explosive mishaps, and the FY05-09 averages of number and rates. There rates fall in FY07 and remain relatively steady from that point forward.

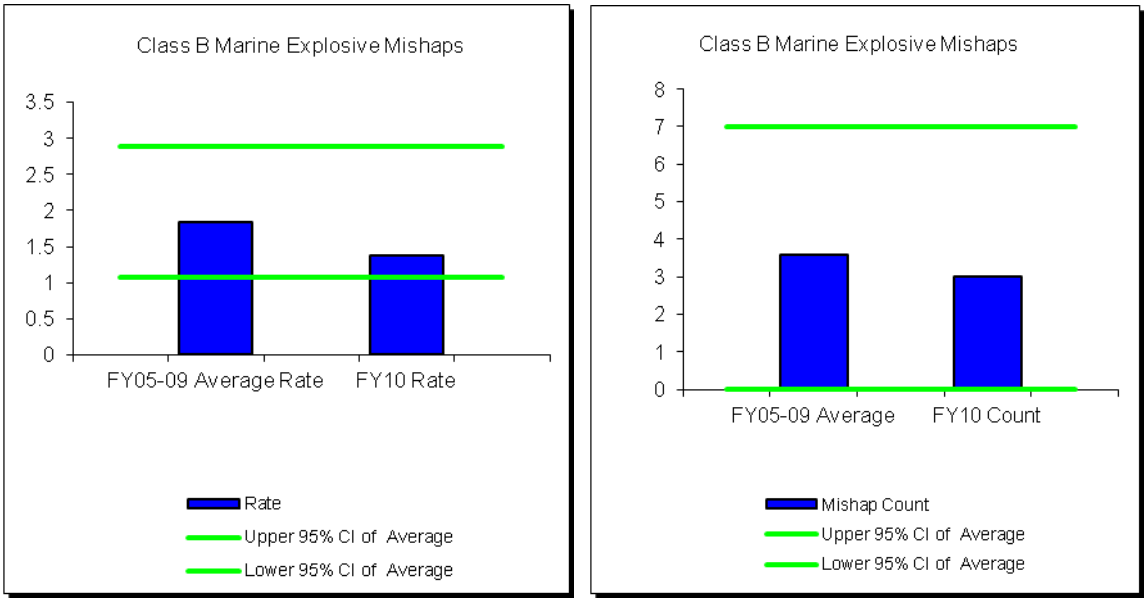

Figure 7: Marine Class B On Duty Explosive Mishaps

Analyzing the FY10 Class B Marine on duty explosive mishap rate and count, there is neither and increase or decrease in the FY10 rate or count. This can be seen in the two graphs in Figure 7. The FY10 rate and the 5 year average along with confidence interval are graphed in the first diagram and the FY10 count and 5 year average along with the confidence interval are graphed in the second diagram. For both diagrams, the FY10 rate and count fall within the confidence interval indicating no statistical significant differences between the FY10 rate and count and the 5 year averages of rates and counts.

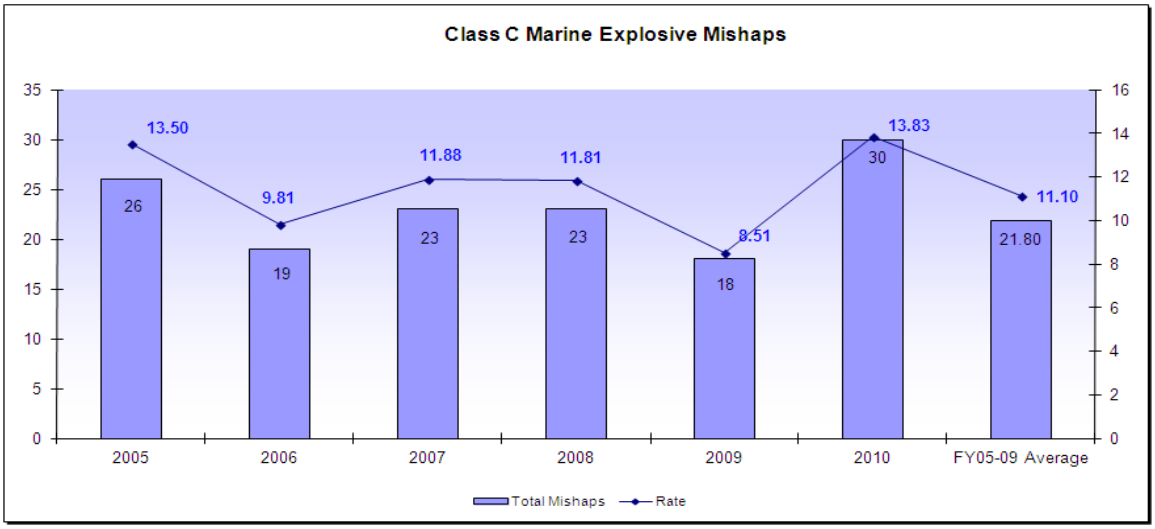

Figure 8: Marine Class C On Duty Explosive Mishaps

Figure 8 graphs the number and rate of Marine Class C on duty explosive Mishaps along with the 5 year average number and rate. The number and rates seem to peak in FY05 and FY10 and level out between the fiscal years.

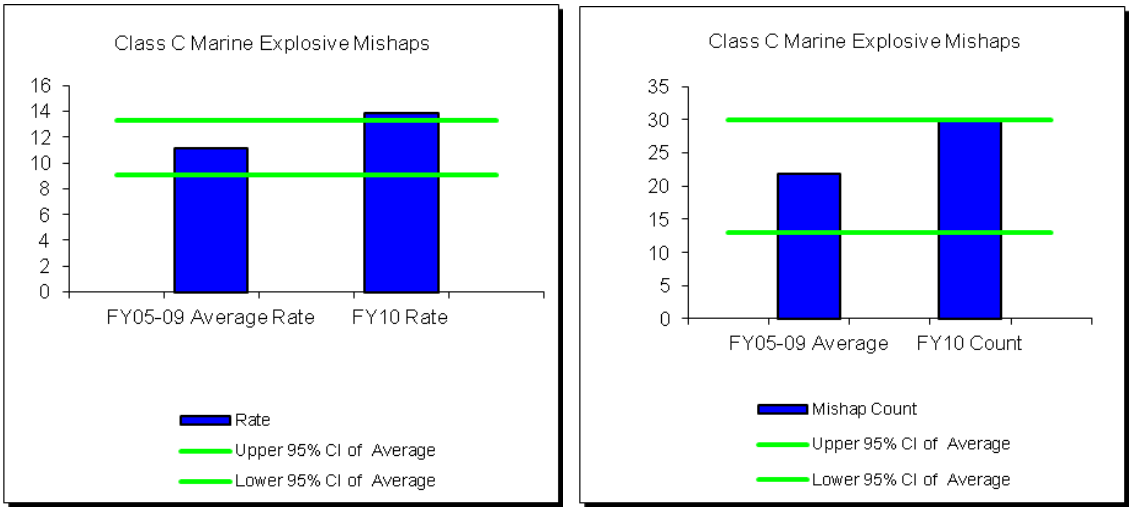

Figure 9: Marine Class C on duty Explosive Mishaps

Just like Figure 7, the first graph in Figure 9 graphs the 5 year average Marine Class C on duty explosive mishap rate, the FY10 Marine Class C on duty mishap rate and the 95% confidence interval presented by the green lines. The FY10 rate is above the confidence interval indicating there is a statistically significantly increase in the FY10 rate as compared to the previous 5 years rates. The second graph is very similar to the first graph except it graphs the count data for Class C Marine on duty explosive mishaps. The FY10 count is at the upper limit of the confidence interval. If one more mishap had occurred, there would have been a statistically significant increase in the count.

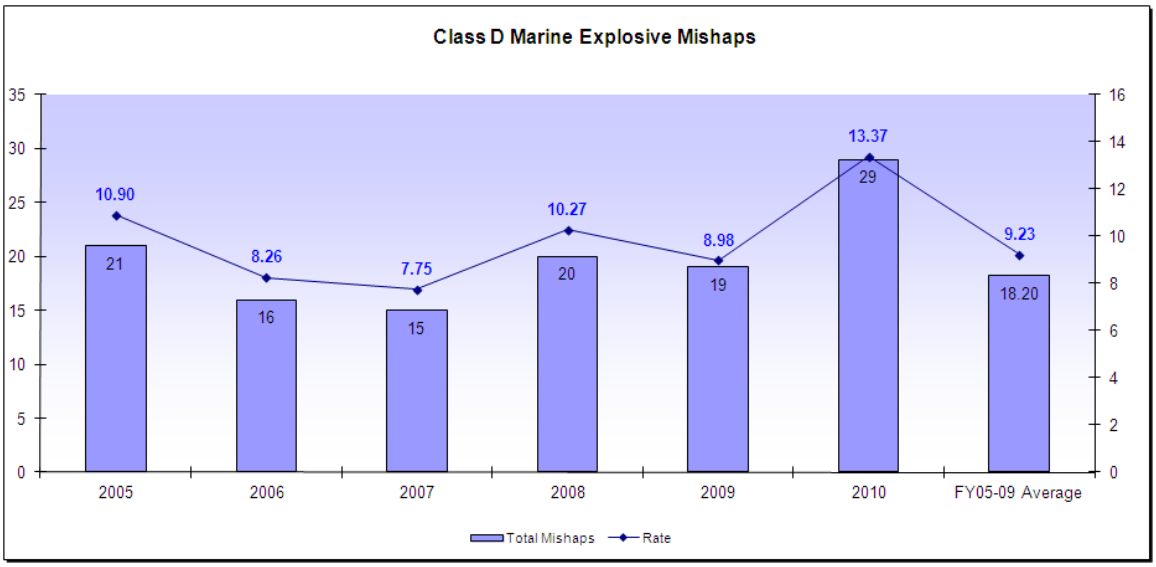

Figure 10: Marine Class D On Duty Explosive Mishaps

The final piece of the analysis focuses on Marine Class D on duty explosive mishaps. Figure 10 graphs the numbers and rates for Marine Class D on duty explosive mishaps along with the 5 year averages of count and rate. The rates seem to be on an upward trend with the peak occurring in FY10 with a rate of 13.37 mishaps per 100,000 Marines.

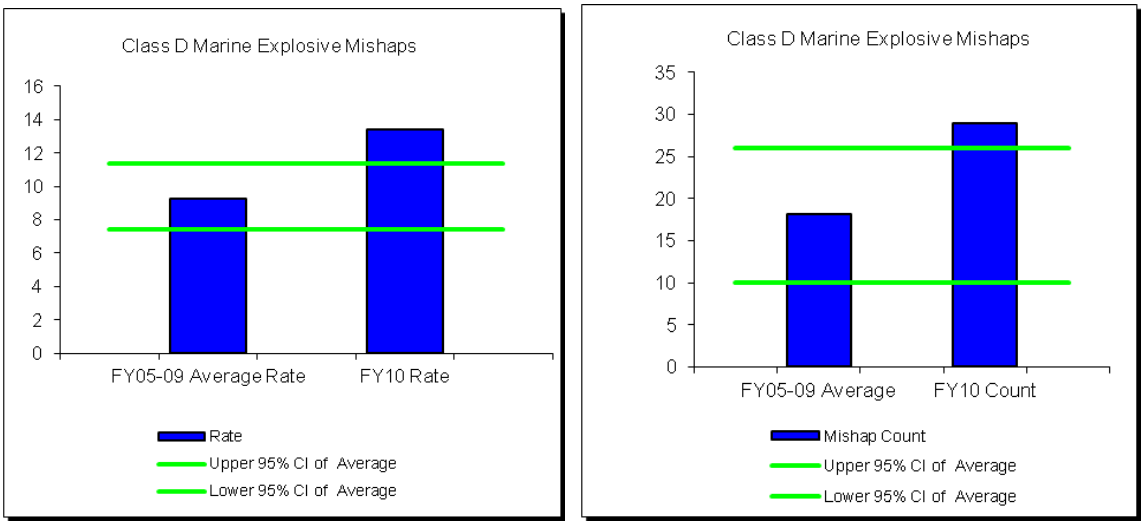

Figure 11: Marine Class D On Duty Explosive Mishaps

Using the Poisson Distribution, the FY10 rate and number of mishap are analyzed to determine if there are any statistically significant difference in the FY10 rate and number and the previous 5 fiscal years rates and numbers. The first graph in Figure 11 graphs the 5-year average rate and the FY10 rate along with the 95% confidence interval depicted by the green lines. The second graph in Figure 11 graph is the same manner the number of mishaps. For both graphs, FY10 rate and count exceed the upper confidence boundary indicating there is a statistically significant increase in the FY10 rate and count as compared to the 5 previous fiscal years.

Conclusion

As of 16 February 2011, the FY10 Marine on duty explosive mishap rate is 29.05 mishaps per 100,000 Marines. There is a statistically significant increase in both the FY10 Marine on duty explosive mishap rate and count as compared to the previous 5 fiscal years rates and counts. When separating the explosive mishap data into event severity classifications of A, B, C and D, there are statistically significant increases in the FY10 Class C and D mishap rates. It can be concluded that Class C and D mishaps are the contributing factors to the increase in FY10 Marine on duty explosive mishap rate.